

ABSTRACT

A low-power-loss power semiconductor switching device and its fabricating method are proposed to provide a low-power-loss IGBT, MCT, or GTO with a voltage rating of less than 2 kV, wherein said device includes a combination of an ultra-thin lightly-doped back-side p⁺ emitter formed by ion implanting and a nonuniformly-doped n-type base layer which contains a residual layer of a priorly-diffused n⁺ layer on one side. And in accordance with said method, the residual diffused-layer near the p⁺ emitter contained in the nonuniformly doped base is formed in the first step of the fabricating process before the thinning of the substrate. After the thinning of the substrate, only low-temperature processes occur. This invention combines the feature of low on-voltage of a PT-IGBT and the feature of short switching time of an NPT-IGBT, and is very applicable to practical manufacturing.

Figure 1 is the selected drwaing.